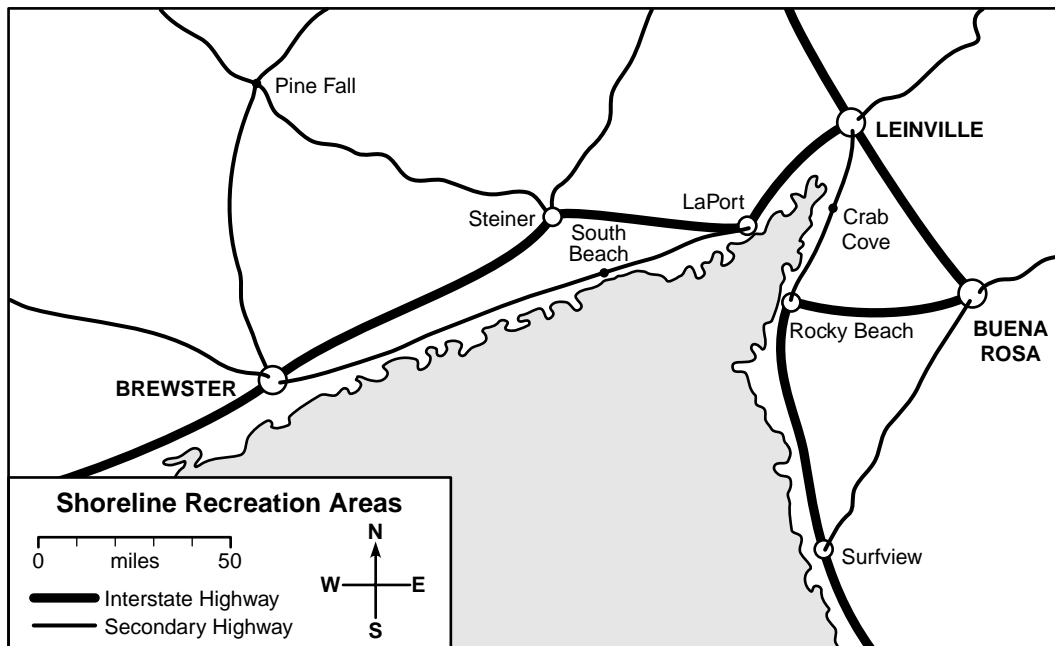


1995 Released Items

The Camping Trip

Use the information below to answer questions 1-3.

Alberto, Luis, David and Mike all live in Brewster. They are planning a trip to the state campground at Rocky Beach. A map of the area is shown below.



The Camping Trip (continued)

1. The group is thinking about taking the new interstate highway all the way to Rocky Beach. Their car averages 24 miles per gallon and gas costs \$1.29 per gallon.

Use the map to make a reasonable estimate for how much the gasoline will cost for a trip to the campground and back assuming they travel only on the interstate. Show the mathematics you use to make a reasonable estimate and explain how you arrived at your estimate.

2. The group plans to leave Brewster at 7 A.M. and travel only on the interstate. If they can average 50 miles per hour on the interstate and if they stop once for 45 minutes for a snack, what is a reasonable estimate of the time of their arrival at Rocky Beach? Show the mathematics you use to make a reasonable estimate of the time of arrival and explain how you arrived at your estimate.
3. In addition to an average of 50 miles per hour on the interstate, the group also knows that they can travel at an average of 30 miles per hour on the secondary roads. To get to Rocky Beach in the shortest time, Mike suggests that they take the route that covers the fewest miles. David suggests that they just stay on the interstate. Whose suggestion will get the group to Rocky Beach first?

Compare the suggestions of Mike and David and decide which route will take the least time. Justify your decision.

Concentration of Medication in the Bloodstream

The effect of certain pain-killing medications can be described by mathematical formulas. Doctors often use the formulas and their graphs to show how the concentration of medication in the bloodstream changes as time passes. This information can be used to decide when additional doses should be given.

In the formulas represented in questions I through 5, t represents the time in hours since the medication was given, and C represents the concentration of the medication in milligrams per liter of blood.

1. Graphing the Concentration

The concentration formula for one of these medications is shown below:

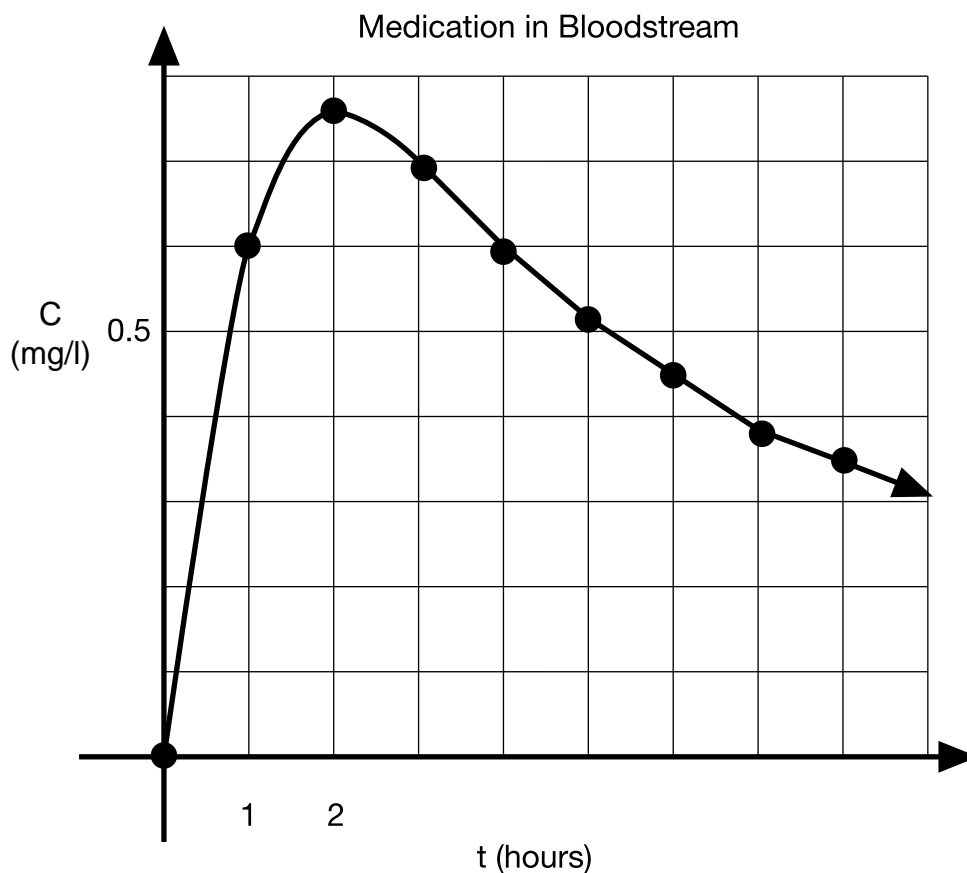
$$C = \frac{2t}{t^3 + 1}$$

Use the formula to find the missing concentration in the table provided in the answer booklet. Round your answer to the nearest tenth and enter it into the table. Then plot the points and sketch the graph on the grid that is provided in the answer booklet.

Concentration of Medication in the Bloodstream (continued)

Use the information below to answer questions 2-3.

To analyze the effect of another medication, a doctor displayed the graph of its concentration over time on a graphing calculator. The concentration formula for this medication is $C = 3t/4 + t^2$. The graph is shown below.



2. Drawing Conclusions

What conclusions about the concentration of medication in the bloodstream can you make for this period of time included on the graph? Use the graph to support your conclusions.

3. Concentration Over Time

Suppose that the doctor gives only one dose of the medication. Use the graph and the formula to explain what happens to the concentration of the medication after the time period shown on the graph (e.g., $t > 9$ hours). Support your conclusion by substituting two or more values for time.

4. Aspirin Relief

When aspirin is taken orally, the amount of relief that it provides can be modeled by the equation

$$r=4t-t^2$$

where r is the amount of relief provided and t is the number of hours that have elapsed since taking the aspirin.

After how many hours is the obtained relief at a maximum? Explain your reasoning.

[You may use any method to determine your answer, but be sure to show the mathematics you use to determine your answer. The graph is provided for your convenience.]

5. The Blood Test

Olympic Clinic Blood Test Schedule (Appointment Required)	
1 P.M.	5 P.M.
2 P.M.	6 P.M.
3 P.M.	7 P.M.
4 P.M.	8 P.M.

An Olympic athlete must have his blood tested for the presence of illegal substances. At 6 P.m. on the evening before the test, an athlete took a prescription medication whose concentration formula is

$$C=\frac{3}{t^2}$$

Because the medication can interfere with the blood test, its concentration must be less than 0.01 mg/l when the athlete's blood is tested.

Of the times shown in the Blood Test Schedule, what is the earliest time at which the concentration of the medication will be below the required level? Show the mathematics you use to determine your answer.

Microwave Cooking

Tony bought a new microwave oven. The table below is in the microwave cooking guide. Use this information to answer questions 1-4.

COOKING TIME FOR VEGETABLES		
VEGETABLE	AMOUNT	TIME IN MINUTES
Asparagus	1 lb	16
Beans	1 lb	15
Broccoli	1 lb	12
Carrots	1 lb	14
Okra	1 lb	7
Important Notes:		
When cooking 2 pounds, increase the cooking time by $\frac{1}{3}$		
When cooking $\frac{1}{2}$ pound, decrease the cooking time by $\frac{1}{4}$		

1. Tony is going to cook 2 pounds of carrots. How many minutes should he cook them in the microwave?
2. Suppose Tony wants to cook about $\frac{1}{2}$ pound of okra. To the nearest minute, how long should he cook the okra in the microwave?
3. The cooking guide also indicates that the number of minutes required to cook medium-sized potatoes can be determined using the following formula:

$$M = 3 + 2N$$

where **M** is the number of minutes, and
N is the number of medium-sized potatoes.

How many minutes will Tony need to cook 4 medium-sized potatoes?

Microwave Cooking (continued)

4. The cooking guide also includes a formula for the temperature of a liquid after it is heated in the microwave on high. The guide indicates that:

$$T = \left(\frac{7}{6}\right) S + I$$

where **T** is the new temperature,
 $\frac{7}{6}$ (degrees per second) is the rate of heating,
S is the number of seconds, and
I is the initial temperature of the liquid.

To the nearest degree, what is the temperature of a liquid that is heated on high in the microwave for 30 seconds if the initial temperature was 60°F?

Monthly Budget

Use the chart below to answer questions 1 through 5.

The chart below shows the monthly budgets (in dollars) of 5 people for 6 categories of expenses.

CATEGORY	JIM	JOAN	JACK	JULIE	KATHY
RENT	250	375	300	185	205
AUTO	150	275	180	320	250
FOOD	95	130	100	150	110
CLOTHES	75	50	110	80	175
RECREATION	20	30	40	15	50
SAVINGS	50	150	75	90	115
TOTAL	640	1010	805	840	905

1. What percent of Jim's total budget goes for rent?
2. What is the average (mean) clothing budget for the 5 people?
3. How much does Joan spend on auto expenses per year?
4. Kathy's total budget is what percent higher than Jack's total budget?
5. What is the median amount budgeted for rent in the budgets of the 5 people?